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PHYSIOLOGY.¹

Mr. Victor Horsley, F. R. S., who has done so much to advance the knowledge of cerebral localization, has been elected Fullerian Professor of Physiology at the Royal Institution of Great Britain, London.

Among the subjects of memoirs for which the Boston Society of Natural History offers prizes is "Original Investigation on the Physiology of Flight." The first prize is \$60 to \$100, and the second \$50. The memoir must be in English, and must be presented before April 1, 1891. For particulars address the secretary, J. Walter Fewkes.

Time-Relations of Mental Phenomena.—In the sixty pages of his book,² Professor Jastrow has made a most excellent, valuable, and apparently careful résumé of the work done in this field. Simple reaction times are first discussed and analyzed, together with the effects of various conditions influencing them, such as the nature of the impression, the intensity of the stimulus, the mode of reaction, the subject's foreknowledge of what is to take place, distraction, practice, fatigue, and also the differences between motor and sensory reactions, individual variations, the action of drugs, and reaction times in the insane. Methods of experimentation are touched upon, and a table of simple reaction times, as determined by the leading investigators, accompanies. Complex or adaptive reactions, involving distinction and choice, are similarly treated, and an excellent and full table of complex reaction times is given. Several pages are devoted to a discussion of association times. There is added a fairly complete bibliography, made more valuable by its classification in accordance with the text.

Foster's Text-Book of Physiology.—The third part of the fifth edition of this work, just published by Macmillan, is a book of nearly three hundred pages, and is devoted to the central nervous system. The treatment of the subject has been entirely changed, much histological and other matter has been added, including excellent new figures, and the whole, nearly five times larger than its former size, may be considered practically a new work. It is doubtless entirely safe to say that it forms the best general treatment of the subject existing in English, if not in any language. It is a great advantage to have the histology discussed from the standpoint of the physiologist, with the

¹ This department is edited by Dr. Frederic S. Lee, Bryn Mawr College, Bryn Mawr, Pa.

² The Time-Relations of Mental Phenomena, by Joseph Jastrow. New York, N. D. C. Hodges, 1890.

Am. Nat.—December.—7.

function of the part ever in view. Noticeable throughout the book is the increased and careful attention paid to the differences in the actions of the nervous systems of different species of animals and the principle of evolution of function. This principle is rightly occupying an ever-widening field in physiology, and that this is so is demonstrated by the fact that this, the foremost physiological text-book in the English language, gives it prominent consideration. Also noticeable throughout is the constant endeavor to impress the reader with an idea of the extreme complexity of cerebral operations, and the present impossibility of separating from the whole and sharply formulating the functions of a particular organ, like the optic thalamus or the cerebellum. "The physiologist ought not to use the words, 'functions of the cerebellum.' From a physiological point of view it is, so to speak, a matter of accident, that various structures, the seats of various physiological processes, have, from morphological causes, been gathered together into the body which anatomists call the cerebellum. The task of the physiologist is to unravel the ties binding these various cerebellar structures with other parts of the central nervous system, and so with various parts of the body at large." The discussions of disputed points are full, lucid, and admirable. The parts on the special senses and on reproduction remain yet to be published.

The Brain of Laura Bridgman.—The case of the blind deaf-mute, Laura Bridgman, is known the world over. Born a normal child in Hanover, N. H., in 1829, she lost almost completely, at about two years of age, through an attack of scarlet fever, her special senses, except that of touch—more exactly, the left eye was entirely blinded by the disease, but sight remained, very slightly developed, in her right eye up to the eighth year; hearing and power of speech together disappeared with the disease; smell remained very unimportant and variable throughout life; taste persisted in a small degree; the temperature sense was poor, while touch continued very acute. At about eight years of age she entered the Perkins Institution, Boston, and her education was taken in charge by Dr. S. G. Howe, the director. The results of her training are well known. Her mental development became remarkable, considering her defective avenues for the incoming of sense impressions. At twenty years of age her regular education ceased, but she continued to reside at the institution until her death in May, 1889.

A study of the brain of such an individual would be interesting, as showing the correlation of brain structure and mental development. After her death the brain was placed in the hands of Dr. H. H. Donaldson, of Clark University, for study. The first report upon the subject has just been published.¹ The author has made an extremely careful

¹ *American Journal of Psychology*, Vol. III., 1890, p. 293.

and exhaustive detailed examination of the brain, and the report is a model for its fulness and careful attention to the exact description of his procedure.

The paper deals only with the gross anatomy of the brain. Estimations of the volume (1178 c.c.) and weight (1204 grms.) showed no especial deviations from those of other brains. The cerebrum was markedly brachycephalic. A general outlook over the whole encephalon showed no striking anomalies, but a careful study of the surface of the cerebral hemispheres combined with measurements of the cortical areas revealed some interesting facts. That portion of the left inferior frontal convolution, that is generally believed to contain the centre for articulate speech, was found poorly developed, and on both sides the Island of Reil was exposed more than normally, that of the left side nearly three times that of the right. The occipital lobes were somewhat flattened. The *cuneus*, which is supposed to contain the centre for vision, was normal on the left side, but imperfectly developed on the right, a fact that is to be correlated with the blindness of the left eye, and the partial sensitiveness of the right eye to light for the first seven years of Laura's life. The temporal lobes were disproportionately small, but alike on both sides. No decided evidence of defective development of the centres for hearing, smell or taste, or of exaggerated development of the centre for touch, could, however, be deduced from the gross anatomy. Measurements of the cortical areas demonstrated a better superficial development of the right Island of Reil, than the left, of the right frontal lobe than the left (due largely doubtless to the defective left inferior frontal gyrus), of the left occipital lobe than the right, and of the left "residual portion" than the right. The superficial area of the whole left hemisphere was greater than that of the right, which the author associates with the fuller development of the caudal portions of the hemisphere. Compared with the measurements of H. Wagner, Jensen and Calori, Laura's brain possessed a total area small for its weight, a fairly average length and depth of its sulci, and a slightly less than average development of the area of the frontal lobes. Reports on the thickness of the cortex and on the internal anatomy and histology are not yet published.

Course of Sensory Fibres.—The course of the sensory nerve fibres through the spinal cord and brain is not so fully understood as that of the motor fibres. His believes that the real nucleus of most sensory fibres is in the ganglion of the posterior root, not in the cord. The work of Schiefferdecker, Krause, Schwalbe, Lissauer, Bechterew, Kahler, and Takacz, has shown that upon entering the cord the posterior root fibres go in two directions, namely, a portion direct into

the posterior white columns, and a portion into the grey matter of the posterior horn. Of the former, Singer's view is supported by others, and seems correct, viz.: That these fibres form long paths direct to the medulla oblongata, where they end in the nuclei of the posterior columns. From here continuing fibres go to the cerebellum and elsewhere; but the work of Edinger, Flechsig, and Meynert has proved that a great number of the continuing fibres cross to the opposite side, and as a part of the fillet go anteriorly, and end in the corpora quadrigemina. The latter portion of the posterior root fibres mentioned above, those entering the posterior cornu, disappear in its grey matter, but the connections of this are difficult to follow. Beyond the fact that fibres may be traced laterally from Clarke's column through the lateral white columns to the direct cerebellar tract, and thence anteriorly, much confusion exists as to the fate of the other posterior cornu fibres.

Edinger¹ has employed embryological combined with comparative anatomical methods, beginning with *Anguis fragilis*, and confirming his results on other reptiles, fishes, amphibians, and mammals. From the nucleus of each sensory cranial nerve (V., IX., X.) he traces a bundle of fibres across in the medulla and anteriorly as a part of the fillet to the corpora quadrigemina. The striæ acusticæ, from the nucleus of the eighth, take the same course (Monakow). Edinger calls this connection the "central sensory path" of the cranial nerves, and searches for an analogous tract in connection with the spinal nerves. In various forms he finds this in bundles of fibres emerging from the grey matter of the posterior cornu, crossing in the anterior commissure to the antero-lateral white columns, thence ascending, joining the fillet, and ending in the mid-brain. The existence of such a "central sensory path" of the spinal nerves is confirmed by physiological experiment, by embryology, *e.g.*, His, and by pathological anatomy, *e.g.*, Auerbach and Rossolymo have found this path degenerated after destruction of the posterior horns. Hence we seem to be in a fair way to understand the central connections of the posterior root fibres. Leaving out of account those going to the cerebellum, and some few others not well understood, there are two groups. In one the fibres enter the posterior columns, ascend, pass through the ganglia of those columns, cross, and as a part of the fillet go to the corpora quadrigemina. In the other the fibres join the grey matter of the posterior cornu, cross in the anterior commissure, ascend in the antero-lateral white columns, and as another part of the fillet go also to the corpora quadrigemina.

¹ *Deutsche Med. Wochenschrift*, May, 1890, No. 20, p. 421.